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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
THOMPSON, JAMES A	
ART UNIT	**PAPER NUMBER**
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/823,372	DOLAN ET AL.	
	Examiner	Art Unit	
	James A. Thompson	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-15,17,18,20-28,34 and 40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see page 7, lines 3-4, filed 29 April 2005, with respect to the abstract have been fully considered and are persuasive. The objections to the abstract listed in item 1 of the previous office action, dated 05 November 2004, has been withdrawn.

2. Applicant's arguments, see page 7, lines 5-20, filed 29 April 2005, with respect to the rejections of the claims under 35 USC §112, 2nd paragraph, have been fully considered and are persuasive. The rejections of the claims under 35 USC §112, 2nd paragraph listed in items 2-5 of said previous office action have been withdrawn.

3. Applicant's arguments, see page 8, filed 29 April 2005 have been fully considered but they are not persuasive. Applicant's arguments are directed to the present amendments to the claims and not to the claims as filed immediately prior to said previous office action. The rejections of the present claims on the basis of prior art is given in detail below. Any and all new grounds of rejection have been necessitated by the present amendments to the claims.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 9-15, 17-18, 20-28, 34 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amidei (US Patent 5,995,661) in view of Kowalski (US Patent 5,778,104).

Regarding claim 40: Amidei discloses an imaging system (figure 1 of Amidei) for sensing an object (column 3, lines 6-9 of Amidei), said imaging system comprising an imaging sensor (figure 1(11) and column 3, lines 6-9 of Amidei); and a backing having a surface opposed to said sensor, as shown in figure 1 of Amidei and pointed out in the figure below ("image backing").

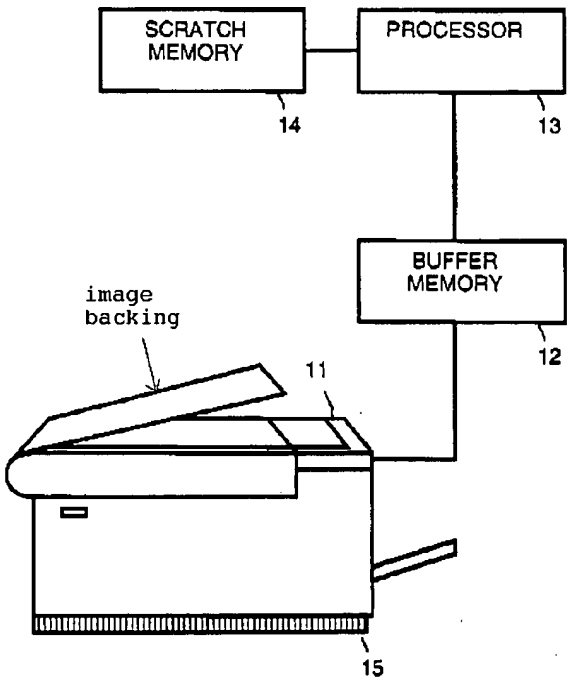

FIGURE 1

Said imaging system further comprises an image processor (figure 1(13) and column 3, lines 3-5 of Amidei) having a plurality of stat buffers (figure 1(14) and column 2, line 67 to column 3, line 5 of Amidei) and that analyzes candidate edges for bounding regions (column 3, lines 10-12 and lines 17-22 of Amidei) and detects a bounding region (column 3, lines 17-22 of Amidei) based, at least in part, on a gray scale difference threshold value that causes detection of candidate edges (column 4, lines 62-66 and column 6, lines 35-38 of Amidei) cast by a shadow on said backing (column 2, line 66 to column 3, line 1 of Amidei); and the presence of candidate edges in a contiguous plurality of stat buffers (column 3, lines 10-17 of Amidei). The scratch memory (figure 1(14) of Amidei) is used to process the image data stored in the buffer memory (column 2, line 67 to column 3, line 2 of Amidei). The processor processes each element of the image data in order (column 3, lines 6-10 of Amidei) using relevant statistics for horizontal and vertical edges (column 3, lines 10-12 of Amidei), attempting to extend previously identified edge segments (column 3, lines 12-14 of Amidei), and keeps track of the appropriate columns and rows (column 3, lines 14-17 of Amidei). Each stat buffer, of the plurality of stat buffers, is a portion of the scratch memory that the processor uses to store the relevant image data, including the contiguous detected edges which are related by column and/or row. Further, as is well-known in the art, when an document is scanned in using a flat-bed scanner (column 2, line 66 to column 3, line 1 of Amidei), such as the one shown in figure 1 of Amidei, scanning is performed in part by casting a shadow on the backing.

Amidei does not disclose expressly that said bounding region detection is based on a luminance threshold value that causes detection of candidate edges.

Kowalski discloses filtering a grayscale image based on the minimum and maximum luminance values in a neighborhood of pixels (column 4, lines 35-41 of Kowalski).

Amidei and Kowalski are combinable because they are from the same field of endeavor, namely image data scanning and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to filter the image data based on the luminance values, as taught by Kowalski, rather than the gray scale value, as taught by Amidei. Thus, the bounding region detection would be based in part on a *luminance* threshold value that causes detection of candidate edges, rather than a *gray scale* threshold value that causes detection of candidate edges. The suggestion for doing so would have been that luminance values are simply another metric used to measure image pixel data. Further, as is well-known in the art, luminance values are based directly on the physical amount of light captured by the physical scanner, and are thus more indicative of the "true" image. Therefore, it would have been obvious to combine Kowalski with Amidei to obtain the invention as specified in claim 40.

Regarding claim 12: Amidei discloses setting a difference threshold for the grayscale values in determining an edge (column 4, lines 62-66 of Amidei).

Amidei does not disclose expressly that said imaging system increases the differences of luminance values in the range of likely document edge values.

Kowalski discloses filtering a grayscale image based on the minimum and maximum luminance values in a neighborhood of pixels (column 4, lines 35-41 of Kowalski).

Amidei and Kowalski are combinable because they are from the same field of endeavor, namely image data scanning and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to filter the image data based on the minimum and maximum luminance values, as taught by Kowalski. Therefore, in the system taught by Amidei, the differences of values in the range of likely document edge luminance values would be increased since there is a greater discontinuity in luminance value in the neighborhood of an edge. The motivation for doing so would have been to improve the quality of an image which comprise a combination of features (column 3, lines 2-7 of Kowalski). Therefore, it would have been obvious to combine Kowalski with Amidei to obtain the invention as specified in claim 12.

Regarding claims 9 and 13: Amidei discloses that said imaging system uses pre-scanned grayscale image data for determining at least one boundary of said object (column 3, lines 6-10 of Amidei). As is well-known in the art, the grayscale level of a pixel is the luminance level of the pixel.

Amidei does not disclose expressly that said imaging system converts a first color space of an image obtained from sensing said object to a second color space where the luminance of said image is enhanced over the first color space.

Kowalski discloses converting a first color space of an image obtained from sensing said object (column 3, lines 53-59 of Kowalski) to a second color space (column 3, lines 66-67 of Kowalski), where the luminance of said image is enhanced over

the first color space (column 4, lines 2-11 of Kowalski). Computing the luminance values by using different coefficients, and therefore different proportions, of the color components (column 4, lines 2-11 of Kowalski) enhances the luminance values of the first color space.

Amidei and Kowalski are combinable because they are from the same field of endeavor, namely image data scanning and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to convert a color document into enhanced luminance values, as taught by Kowalski, in order to detect the boundaries using the imaging system taught by Amidei. The suggestion for doing so would have been that the imaging system of Amidei operates based on the luminance values of the image (column 3, lines 6-10 of Amidei). Therefore, if a color image is to be processed, the color component values need to be converted into luminance values for processing. Therefore, it would have been obvious to combine Kowalski with Amidei to obtain the invention as specified in claims 9 and 13.

Further regarding claim 10: Kowalski discloses that said first color space includes a plurality of dimensions (column 3, lines 46-51 of Kowalski) and said second color space includes fewer dimensions than said first color space (column 4, lines 4-11 of Kowalski). There are three color components, such as RGB, in said first color space (column 3, lines 46-51 of Kowalski) and only one color component (luminance) in said second color space (column 4, lines 4-11 of Kowalski).

Further regarding claim 11: Kowalski discloses that said first color space is red, green and blue (column 3, lines 51-52

of Kowalski), and said second color space is luminance (column 4, lines 4-11 of Kowalski).

Regarding claim 14: Amidei discloses that an image obtained from sensing said object has a plurality of horizontal rows of pixels vertically aligned with respect to each other, as demonstrated by the setup of the horizontal edge processing (column 6, lines 56-61 of Amidei). Further, said imaging system groups said horizontal rows of pixels into a plurality of vertically contiguous groups (column 7, lines 17-19 and lines 27-32 of Amidei). The horizontal rows are grouped in groups of three, the current row, the row above the current row (column 7, lines 17-19 of Amidei), and the row below the current row (column 7, lines 27-32 of Amidei), and are thus vertically contiguous. Further, said imaging system computes a statistical measure in a direction transverse to said horizontal row of pixels, using said statistical measure when detecting said boundary region (column 6, lines 33-37 of Amidei). A measure of the difference between rows is measured for each set of rows and the difference are thresholded to determine if a horizontal edge exists (column 6, lines 33-37 of Amidei). Since the difference is between rows, the computation is performed in the transverse direction, thus determining the local gradient in the vertical direction.

Regarding claim 15: Amidei discloses that an image obtained from sensing said object has a plurality of vertical columns of pixels horizontally aligned with each other, as demonstrated by the setup of vertical edge processing (column 5, lines 1-9 of Amidei). Further, said imaging system groups said vertical columns of pixels into a plurality of horizontally contiguous groups (column 5, lines 20-29 of Amidei). Vertical

columns are grouped in groups of three, the current column (i), the column to the left of the current column (i-1), and the column to the right of the current column (i+1), for the computation of temp1 (column 5, lines 20-29 of Amidei), and are thus horizontally contiguous. Further, said imaging system computes a statistical measure in a direction transverse to said vertical column of pixels, using said statistical measure when determining said boundary region (column 4, lines 60-64 of Amidei). A measure of the difference between columns is measured for each pair of columns and the differences are thresholded to determine if a vertical edge exists (column 4, lines 60-64 of Amidei). Since the difference is between columns, the computation is performed in the transverse direction, thus determining the local gradient in the horizontal direction.

Regarding claims 17 and 18: Amidei discloses that said imaging system detects edges using said statistical measure (column 4, lines 60-64 and column 6, lines 33-37 of Amidei).

Regarding claim 20: Amidei discloses that a set of statistical measures in a direction traverse to said horizontal row of pixels from a plurality of said groups are statistically processed for detecting said boundary region (column 6, lines 43-49 and lines 56-61 of Amidei). The current statistics which are used for horizontal edge detection are based upon the values obtained in previous iterations (column 6, lines 43-49 and lines 56-61 of Amidei). Therefore, the statistical measures are statistically processed from the plurality of said groups as the horizontal edge detection process iterates.

Regarding claim 21: Amidei discloses that a set of statistical measures in a direction traverse to said vertical

column of pixels from a plurality of said groups are statistically processed for detecting said boundary region (column 5, lines 10-19 and lines 30-33 of Amidei). The current statistics which are used for vertical edge detection are based upon the values obtained in previous iterations (column 5, lines 10-19 and lines 30-33 of Amidei). Therefore, the statistical measures are statistically processed from the plurality of said groups as the vertical edge detection process iterates.

Regarding claims 22 and 23: Amidei does not disclose expressly that the statistical processing said set of statistical measures emphasizes spatial regions of increased statistical measure.

Kowalski discloses further processing spatial regions of increased statistical measure to emphasize said regions (column 4, lines 37-39 and lines 56-61 of Kowalski). Filter values are determined for a neighborhood of pixels (column 4, lines 37-39 of Kowalski) based on the statistical measure of said neighborhood (column 4, lines 56-61 of Kowalski).

Amidei and Kowalski are combinable because they are from the same field of endeavor, namely image data scanning and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to filter the image data based on the variation between the minimum and maximum luminance values of a group, as taught by Kowalski. Therefore, in the system taught by Amidei, the variation of the luminance values would determine how much emphasis a group would receive, depending on whether or not there is an edge. The motivation for doing so would have been to improve the quality of an image which comprise a combination of features (column 3, lines 2-7 of Kowalski). Therefore, it would have been obvious

to combine Kowalski with Amidei to obtain the invention as specified in claims 22 and 23.

Regarding claims 24 and 25: Amidei discloses that the thresholds for the vertical and horizontal edge detections can be set to alternate selected values (column 4, lines 64-67 and column 5, lines 39-40 of Amidei).

Amidei does not disclose expressly that said imaging system determines said at least one boundary of said object based upon a variable said threshold value calculated using said set of statistical measures.

Kowalski discloses that the filter values of a neighborhood of pixels are variable and are determined using the statistical measure of a neighborhood of pixels (column 4, lines 37-39 and lines 56-61 of Kowalski).

Amidei and Kowalski are combinable because they are from the same field of endeavor, namely image data scanning and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to set the threshold taught by Amidei variably using said set of statistical measures, as taught by Kowalski. The motivation for doing so would have been to improve the quality of an image which comprise a combination of features (column 3, lines 2-7 of Kowalski), and would therefore require a variable threshold. Therefore, it would have been obvious to combine Kowalski with Amidei to obtain the invention as specified in claims 24 and 25.

Regarding claims 26 and 27: Amidei does not disclose expressly that said variable threshold value is calculated based upon a percentage of the maximum observed statistical measure.

Kowalski discloses calculating the variable filter values of the neighborhood of pixels based upon a percentage of the

maximum observed statistical measure (column 4, lines 56-61 of Kowalski). The percentage difference between the maximum and minimum luminance values of the neighborhood of pixels determines the filter value since Lmin changes linearly from 1/9 to 1 as said difference increases (column 4, lines 56-61 of Kowalski). In other words, as percentage difference between Lmin and Lmax increases, the variable filter values increase.

Amidei and Kowalski are combinable because they are from the same field of endeavor, namely image data scanning and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to set the variable threshold discussed in the arguments regarding claims 24 and 25 based on the percentage of the statistical measures, as taught by Kowalski. The motivation for doing so would have been to improve the quality of an image which comprise a combination of features (column 3, lines 2-7 of Kowalski), and would therefore require a variable threshold. Therefore, it would have been obvious to combine Kowalski with Amidei to obtain the invention as specified in claims 26 and 27.

Regarding claim 28: Amidei discloses that an image obtained from sensing said object has a plurality of horizontal rows of pixels, as demonstrated by the setup of the horizontal edge processing (column 6, lines 58-61 of Amidei).

Regarding claim 34: Amidei discloses that an image obtained from sensing said object has a plurality of vertical columns of pixels, as demonstrated by the setup of vertical edge processing (column 5, lines 1-9 of Amidei).

6. Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amidei (US Patent 5,995,661) in view of Kowalski (US Patent 5,778,104) and Lee (US Patent 5,054,098).

Regarding claim 2: Amidei in view of Kowalski does not disclose expressly that said document is a substantially flat document.

Lee discloses scanning and digitizing a paper document (column 7, lines 16-17 of Lee). As is well-known in the art, a paper document is a substantially flat document.

Amidei in view of Kowalski is combinable with Lee because they are from the same field of endeavor, namely the detection of document boundaries. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to scan a substantially flat document, as taught by Lee, with the system taught by Amidei in view of Kowalski. The suggestion for doing so would have been that the image backing shown in the figure above (taken from figure 1 of Amidei) is clearly designed for backing a substantially flat object during image scanning. Therefore, it would have been obvious to combine Lee with Amidei in view of Kowalski to obtain the invention as specified in claim 2.

Regarding claim 3: As can clearly be seen in the figure shown above, and in figure 1 of Amidei, the image backing is a cover and is substantially flat. When closed over said object, which is flat, as discussed in the arguments regarding claim 2, said image backing is clearly in a face-to-face relationship with said object.

7. Claims 4-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amidei (US Patent 5,995,661) in view of Kowalski (US Patent 5,778,104), Lee (US Patent 5,054,098) and Yamanishi (US Patent 5,696,595).

Regarding claim 4: Amidei in view of Kowalski and Lee does not disclose expressly that said cover has a background color that covers a major portion of said cover.

Yamanishi discloses a background color (white) that covers a major portion of a scanner cover (column 10, lines 53-55 of Yamanishi). Since the scanner cover is white (column 10, lines 53-55 of Yamanishi), then clearly the background color (white) covers a major portion of said scanner cover.

Amidei in view of Kowalski and Lee is combinable with Yamanishi because they are from the same field of endeavor, namely scanning and processing image and document data. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to make the background color of the scanner cover of Amidei cover a major portion of said cover, as taught by Yamanishi. The motivation for doing so would have been that the histogram peaks determined by reading a cover with a white background (column 10, lines 55-56 of Yamanishi) are useful in determining density calibrations (column 10, lines 42-46 of Yamanishi). Therefore, it would have been obvious to combine Yamanishi with Amidei in view Kowalski and of Lee to obtain the invention as specified in claim 4.

Regarding claim 5: Amidei discloses that said imaging system is capable of determining a plurality of boundaries (vertical and horizontal edges) of said object (column 3, lines 10-12 of Amidei).

Regarding claim 6: Amidei discloses that said imaging systems is capable of determining four boundaries (top horizontal edge, bottom horizontal edge, left vertical edge, right vertical edge) of said object (column 3, lines 10-12 of Amidei).

Further regarding claim 7: Yamanishi discloses that said imaging device has a flat surface supporting said object (figure 1(117) and column 3, lines 52-55 of Yamanishi). As is well-known in the art, a document plate is flat.

Further regarding claim 8: Yamanishi discloses that said object is paper (column 6, lines 47-52 of Yamanishi).

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

James A. Thompson
Examiner
Art Unit 2624

JAT
07 July 2005

Thomas D. ~~Tommy~~ LEE
PRIMARY EXAMINER